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Is it mere distraction? Peri-traumatic verbal tasks can increase analogue flashbacks but reduce voluntary memory performance☆

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ABSTRACT

Several experiments have shown that we can reduce the frequency of analogue flashbacks with competing tasks presented during a trauma film (i.e. peri-traumatically). A "distraction" hypothesis suggests that any competing task may reduce flashbacks due to distraction and/or a load on executive control. Alternatively, a "modality" hypothesis based on clinical models of PTSD suggests that certain tasks will not protect against intrusions (Experiment 1) and could actually increase them (Experiment 2). Experiment 1 contrasted two concurrent tasks, Verbal Interference (counting backwards in threes) and Visuospatial tapping, against a no-task Control condition during trauma film viewing. The Visuospatial group had significantly fewer intrusions of the film over 1-week than the Control group. Contrary to a distraction account, the Verbal Interference group did not show this effect. Using a larger sample, Experiment 2 showed that the Verbal Interference group (counting backwards in sevens) had more intrusions (and inferior voluntary memory) than no-task Controls. We propose that this is in line with a modality hypothesis concerning trauma flashbacks. Disrupting verbal/conceptual processing during trauma could be harmful for later flashbacks.

1. Introduction

'Flashbacks' are a hallmark symptom of post-traumatic distress disorder (PTSD; American Psychiatric Association, [APA], 1994). In PTSD, vivid, intrusive, negative images of excerpts from a traumatic event "pop" into consciousness, apparently spontaneously, causing distress. The encoding stage has been deemed critical for the subsequent occurrence of flashbacks (for a review see Brewin & Holmes, 2003). Both contemporary theories of PTSD and cognitive memory models conceptualise flashbacks and intrusive memories as reflecting instances of 'faulty information processing' at the time of the trauma i.e. peri-traumatically. Such models include Ehlers and Clark's (2000) cognitive theory of PTSD, dual representation theory (DRT; Brewin, 2001, 2003; Brewin, Dalgleish, & Joseph, 1996), and Conway's model of autobiographical memory (Conway, Meares, & Standart, 2004; Conway & Pleydell-Pearce, 2000), see also Dalgleish (2004). Whilst these theories differ in other respects, in relation to intrusion formation they make similar predictions (see Holmes, Brewin, & Hennessy, 2004; Holmes & Bourne, 2008): that is, extreme emotional responses at points in a traumatic event can cause a shift in processing style away from "conceptual" or "verbal" processing of events (focussing on the situation's meaning) towards more "data-driven", "sensory-perceptual", or "visuospatial" processing (focussing on sensory impressions). This peri-traumatic shift in processing style is theorized to cause those events encoded relatively more perceptually/visuospatially to become intrusive.

The view we describe above leads to two interesting predictions, which we shall refer to as the "modality" hypotheses. First, peri-traumatic disruptions to conceptual/verbal processing should increase later flashbacks. Second, peri-traumatic disruptions to sensory/visuospatial processing should reduce later flashbacks. While there is now accumulating evidence for the latter prediction, evidence for the former is sparse.

The experimental method used to investigate the impact of peri-traumatic processing on subsequent flashbacks is the trauma film paradigm (for a review see Holmes & Bourne, 2008). Healthy individuals are exposed to an event analogous to trauma, namely

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a film depicting stressful or traumatic events such as actual or threatened death or serious injury (PTSD Criterion A; APA, 1994). Any analogue flashbacks to the film (that is, intrusive image-based memories) are recorded in a diary. Participants sometimes find that verbal thoughts about the film may also intrude (Hagenaars, Brewin, van Minnen, Holmes, & Hoogduin, 2010). However our primary interest concerns intrusive images, as an analogue of the vivid, sensory nature of clinical flashbacks. It is the image-based memories in the diary that are analysed accordingly in this study, and referred to henceforth as intrusions. Predictions about impact on intrusion frequency can be tested by manipulating conditions at encoding, for example by using modality specific dual tasks.

Several studies have shown that peri-traumatic visuospatial tasks reduce the frequency of later intrusions. Complex spatial key tapping was used in Holmes et al. (2004, Expts. 1 & 2) and Brewin and Saunders (2001), and clay modelling in Stuart, Holmes, and Brewin (2006). Moreover, such tasks have also been shown to be effective soon post-trauma (Holmes, James, Coode-Bate, & Deeprose, 2009). In contrast, only one study has shown that a peri-traumatic verbal-interference task can increase later intrusions. Holmes et al. (2004, Expt. 3) found that counting out-loud backwards in threes increased the number of intrusions relative to a no-task control group. However, Krans, Naring, and Becker (2009) found that a similar task decreased rather than increased intrusions. According to a general attention and memory approach, it is possible that any dual task at encoding will interfere with film processing and thereby simply reduce intrusions by distraction (see Gunter & Bodner, 2008; Krans et al., 2009). This alternative account we shall refer to as the "distraction" hypothesis.

It should be noted that Gunter and Bodner (2008) used a different experimental paradigm in which (non-clinical) participants were asked to recall unpleasant autobiographical memory concurrent to eye movements (see also: Andrade, Kavanagh, & Baddeley, 1997; Kavanagh, Freese, Andrade, & May, 2001; van den Hout, Muris, Salemink, & Kindt, 2001). Two visuospatial tasks (eye movements as well as a drawing task) and an auditory shadowing task led to reductions in vividness and emotionality. Gunter and Bodner suggested that any distractor task that taxes the central executive could produce benefits when simultaneously holding a memory in mind irrespective of the specific modality of the task. In contrast, results in PTSD patients indicated that modality may be important since concurrent eye movements reduced emotionality and vividness of recalled trauma images relative to no task whereas a verbal counting task did not (Lilley, Andrade, Turpin, Sabin-Farrell, & Holmes, 2009). In the current paper we are interested in the encoding rather than the recall stage, but a similar argument can be posited for distraction versus modality views (Baddeley & Andrade, 2000; Kemps & Tiggemann, 2007).

Other research appears relevant to this debate. A more perceptual encoding style predicted increased intrusions after a film relative to a more conceptual encoding style (Halligan, Clark, & Ehlers, 2002), with related results via a manipulation of these processing styles post-trauma (Kindt, van den Hout, Arntz, & Drost, 2008). A verbal distraction condition post-film (a semantic naming task which could be thought of as interrupting conceptual processing) led to more intrusions than concrete thinking (Ehring, Szeimies, & Schaffrick, 2009). Also, increased conceptual processing has been related to improved outcome in PTSD patients following therapy (Kindt, Buck, Arntz, & Soeter, 2007). However, studies are lacking which compare manipulations of both perceptual versus conceptual processing at encoding to test impact on later intrusions.

Returning to trauma encoding, according to a "distraction hypothesis", the modality of the peri-traumatic dual task would be irrelevant to its effect on intrusions. However, in contrast, our formulation of PTSD theories suggests that peri-traumatic tasks interfering specifically with sensory/visuospatial processing would selectively protect against later intrusions, whereas other tasks would not. We therefore sought to test, within the same experiment, whether a visuospatial, but not a non-visuospatial task, would reduce later intrusions of a trauma film. In a second study, we sought to test the stronger prediction that a verbal/conceptual interference task rather than being distracting would actually *increase* (not decrease) intrusions.

2. Experiment 1

Three peri-traumatic experimental groups were compared for their impact on later intrusions of a traumatic film: (1) a complex visuospatial tapping task; (2) a verbal counting task and (3) a no-task control condition. Identical tasks were used as in Holmes et al. (2004). However, rather than the impact of each task being tested separately against a control condition, in the current study they were compared within a single experiment. It was predicted first, that the visuospatial group would experience fewer intrusions than controls during the week immediately post-film. Second, and against the "distraction hypothesis", we predicted that the verbal interference group would not experience a corresponding reduction in intrusions over the week.

2.1. Method

2.1.1. Design

Using a between-subjects design participants were randomly assigned to one of three conditions: Visuospatial dual task, Verbal Interference dual task, or no-task Control group.

2.1.2. Participants

Forty participants (M age = 29.05 years; SD = 8.09; 23 male) were recruited via advertisements and paid a nominal reimbursement for their participation. Due to ethical considerations, all recruitment material provided information about the nature of the film, specifically that it contained scenes of a traumatic or potentially distressing nature including for example scenes of the aftermath of real-life road traffic accidents.

2.1.3. Trauma film

Participants were shown a 13 min film of real-life footage of the aftermath of road traffic accidents (compiled by Steil, 1996). This film has been used extensively in studies using the trauma film paradigm (e.g. Brewin & Saunders, 2001; Hagenaars, van Minnen, Holmes, Brewin, & Hoogduin, 2008; Halligan et al., 2002; Holmes et al., 2004; Holmes, Oakley, Stuart, & Brewin, 2006; Holmes & Steel, 2004; Stuart et al., 2006). It consists of five separate scenes each introduced by a short commentary providing context for the scene. The trauma film was displayed on a 15 inch colour monitor via a video tape recorder. Viewing distance was approximately 50 cm.

2.1.4. Dual tasks

2.1.4.1. Visuospatial task. As in Holmes et al. (2004), participants were instructed to use their dominant hand to tap a specified spatial pattern on a keypad with a 5 × 5 array of buttons (Moar, 1978). The spatial pattern used was identical to Holmes et al. (2004). A methodological refinement was the removal of lettered button labels from the keypad. This was done to avoid the potential confound that participants might use verbal memory resources for the letter string that constituted the spatial pattern, rather than visuospatial memory resources to encode the actual spatial pattern. Participants were trained in tapping the pattern with the keypad in